

originally presented, claimed invention. Applicants respectfully request that when allowable subject matter is found; that dependent claims 75-78 be rejoined in this application and issued with the claims that they are based upon.

In the Office Action dated September 24, 2002, claim 44 was rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter not described in the specification; claims 40-43, 45-49, 51, and 79 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,069,291 ("Rossin"), optionally in view of U.S. Patent No. 5,151,263 ("Okazake") and U.S. Patent No. 5,649,985 ("Imamura"); and claims 44 and 50 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Rossin and U.S. Patent No. 5,460,792 ("Rosenbaum"). These rejections are respectfully traversed.

Rejection under 35 U.S.C. § 112, first paragraph

Claim 44 was rejected for allegedly containing subject matter not described in the specification. It has been amended to recite "7.2 to 61.3% by weight of zinc oxide." The amount of 14.1 to 40.6% by weight of ZnO was in error, because such a value is true when only ZnO is added. When NiO and ZnO are added, desirable results are obtained when a total of Ni and Zn is 50-1 atomic percent. See page 10 lines 1-9 of instant specification. Because the amount of NiO is limited to 5-40 atomic percent, i.e., 7.2 to 49.4% by weight (see page 11 line 14 of instant specification) when both NiO and ZnO are added, the resulting composition becomes 7.2% by weight or more and 61.3% by weight or less (corresponding to Ni 5 atomic percent and Zn 45 atomic percent). Withdrawal of the rejection of claim 44 under 35 U.S.C. § 112, first paragraph, is requested.

Rejections under 35 U.S.C. § 103(a)

Rossin

Claims 40-43, 45-49, 51, and 79 were rejected as being obvious over Rossin, optionally in view of Okazake and Imamura. The Examiner stated, at page 5 of the

Office Action, that "since Ni is specifically disclosed as one of the additional components that can be added to the aluminum oxide catalyst, thus, the disclosure of Rossin is considered as having 'sufficient specificity' to include alumina-nickel oxide catalyst." The Examiner further stated that "[I]n any event, it would have been obvious to one skilled in the art to select any combination among the specifically disclosed compounds, i.e. nickel-aluminum oxide," and cited Merck & Co., Inc. v. Biocraft Laboratory Inc., 10 USPQ 1846, as support.

Rossin discloses a catalytic process and composition for transforming perfluoro-alkanes (i.e., compounds containing only carbon and fluorine) in the presence of an oxidizing agent and water at temperatures between about 400 to 1,000°C. The catalyst contains aluminum oxide (col. 3, lines 55-58). Additions of between 0.1 to 50% by weight of other components such as barium, calcium, phosphorus, cerium, chromium, cobalt, iron, lanthanum, magnesium, nickel, silicon, titanium, yttrium or zirconium may be added to the catalyst (col. 3, lines 66- col. 4, line 8).

Rossin does not disclose, teach or suggest, a catalyst comprising aluminum oxide and 7.2 to 49.4 wt.% nickel oxide, as recited in Claim 40. Moreover, Rossin does not teach or suggest using such a catalyst to decompose (1) a compound containing carbon and fluorine; (2) a compound containing carbon, hydrogen and fluorine; (3) a compound containing carbon, hydrogen, oxygen and fluorine ; (4) SF₆; and (5) NF₃.

As discussed at the January 23, 2002, personal interview and as shown in the February 7, 2002, Declaration Under 37 C.F.R. 1.132 of Mr. Kanno, the claimed alumina-nickel oxide catalyst exhibits surprising and unexpected results by showing a high level of catalytic activity over an extended period of time. As shown in the 1.132 Declaration, CF₄ and a gas containing CHF₃, CF₄ and C₄F₈ were treated with a catalyst comprising aluminum oxide and a 26.8 wt.% nickel oxide. The catalyst surprisingly maintained a catalytic activity of greater than 99 % for over 2,000 hours. This represents at least a five-fold increase in catalyst life over

the longest run of only 400 hours disclosed in Example XVII of Rossin. Further, an initial conversion rate of the alumina-nickel oxide catalyst is 99%. The conversion rate after 8,000 hours is at least 99% for a gas containing 5,000 ppm CF₄ at 700°C. This is a surprising and unexpected result. Moreover, according to the 1.132 Declaration, the claimed catalyst has been used in several semiconductor and liquid crystal display device manufacturing plants throughout the world since 2000 and to date has not needed to be replaced. The claimed process has also been recognized by several awards, including the U.S. Environmental Protection Agency's Climate Protection Award in 2002, and the Semiconductor International Editor's Choice Best Products Award of 2001.

Rossin does not teach or suggest any catalyst comprising aluminum oxide and zinc oxide. Because the claimed processes exhibit surprising and unexpected results with respect to the catalyst life over an extended period of time, it would not have been obvious for one of ordinary skill in the art to practice the claimed process for treating a gas in view of the teachings of Rossin.

The Examiner points out that Rossin discloses that by adding 0.01 to 50% by weight of Ni, Al₂O₃ can be stabilized and that Ni can be either in the form of a metal or an oxide. As indicated by the Examiner, when fired in the air, a metal oxide is formed, yet there is no description that firing in an inert atmosphere is impossible. Importantly, no working examples are shown as to the use of both Ni and Al.

Instant inventors have found for the first time that a composite oxide of Ni and Al in a special composition range is not only stabilized but also improves the catalytic activity. On the other hand, Rossin lacks any understanding of this inventive idea of the claimed invention. In fact, Rossin is unclear as to whether the composite oxides are always produced or not.

Additionally, Applicants present portions of the file history of the Rossin patent as evidence that Rossin does not provide a sufficient teaching or suggestion of the claimed invention. The (1) originally filed claims, (2) June 5, 1998, Office

Action rejecting these claims, and (3) October 8, 1998, Response are attached as Exhibits 1-3.

Of the twenty-six originally filed claims, claims 1-20 were drawn to a process and claims 21-26 were drawn to a catalyst. See Exhibit 1. Both the process and catalyst claims, specifically claims 4, 17, 22, and 25, included recitations to an aluminum oxide/nickel combination. For example, claim 4 recited that aluminum oxide was stabilized by nickel. See below (base claims 1 and 3 are included) (emphasis added).

1. A process for the transformation of a perfluoroalkane, said process comprising:
 contacting the perfluoroalkane with aluminum oxide.
3. The process of claim 1 wherein said aluminum oxide is stabilized.
4. The process of claim 3 wherein the aluminum oxide is stabilized with an element selected from the group consisting of barium, calcium, cerium, phosphorus, chromium, cobalt, iron, lanthanum, magnesium, nickel, tin, titanium and zirconium.

In a June 5, 1998, Office Action, the Examiner rejected claims 1-20 under 35 U.S.C. § 112, in addition to other grounds of rejection. See Exhibit 2. Specifically, the Examiner found that claims 4 and 17, which recited the aluminum oxide/nickel combination, “[were] not supported by a commensurate enabling disclosure” and “[were] misleading.”

In an October 8, 1998, Response to the June 5, 1998, Office Action, Rossin deleted claims 1-20, and added new claims 27-32. See Exhibit 3. None of the new claims recited an aluminum oxide/nickel combination. Moreover, Rossin repeatedly argued—nearly a dozen times—that the claimed catalyst, as amended, consisted essentially of alumina oxide and stabilizing amounts of zirconia and cobalt. Rossin was silent to the combination of aluminum oxide and nickel. Rossin was also silent as to the use of nickel as a stabilizing compound.

As such, in addition to the other arguments urging that Rossin is an insufficient reference, Applicants provide the Rossin file history as evidence that Rossin does not and cannot support a teaching or suggestion that nickel stabilizes aluminum oxide. The fact that Rossin made a claim to this very feature and was rejected under section 112, then withdrew the claim in view of a more limited one, drawn to zirconia and cobalt and excluding nickel, provides ample evidence of such. It is respectfully submitted that Rossin does not properly teach or suggest the features attributed to it by the Examiner.

Imamura and Okazaki

The “optionally” applied references do not cure the deficiencies of Rossin. Imamura discloses absorption of HF into water, and Okazaki discloses absorption of HF into an alkali aqueous solution. However, neither discloses treatment of gases produced by decomposition, followed by alkali absorption. According to these systems, the temperature of the gases produced by decomposition after passing the catalyst is as high as about 700°C. In order to remove the acid component from the gases produced by decomposition, it is necessary to cool the exhaust gas using water, followed by alkali treatment of the resulting acidic water. At the time of cooling the exhaust gas using water, a part of acidic gases are naturally removed. When high temperature gases produced by decomposition are treated with an alkali aqueous solution, only the water is partially vaporized to cause deposition of solid alkali, resulting in causing a problem of clogging. Even if treated by only water for HF absorption, by-produced acidic waste water cannot be disposed, so that it is necessary to conduct neutralization treatment with an alkali. Therefore, assuming arguendo, even if Imamura and Okazaki could be properly combined with Rossin, the combination does not teach or suggest the claimed invention. Accordingly, withdrawal of the rejection of claims 40-43, 45-49, 51 and 79 is respectfully requested.

Rosenbaum

Additionally, claims 44 and 50 were rejected as being unpatentable over Rossin and Rosenbaum. According to the Examiner, Rossin does not disclose the addition of zinc oxide; however, such is taught by Rosenbaum and it would have been an obvious substitution to "promote the destruction of the halogenated hydrocarbon."

Rosenbaum does not overcome the deficiencies of Rossin. Rosenbaum discloses a process for the removal and destruction of organic compounds in liquid and gaseous streams by complete oxidation of organic compounds in the presence of a carbonaceous catalyst at temperatures below 400°C (Abstract). The carbonaceous adsorbents may be based on pyrolyzed resinous polymers (col. 4, lines 65-67). It should be noted that alumina and the described carbonaceous catalyst are quite different materials.

Based on Rosenbaum, even those skilled in the art cannot estimate the effects of a catalyst containing alumina, nickel oxide and zinc oxide. Although Rosenbaum discloses "any halide," the disclosed examples are only chlorine and bromine compounds. Whether a fluorine compound can be applied or not, is not disclosed. In contrast, according to the present invention, Al and Ni are effective as a composite oxide, which would not have been obvious based on the effects of Zn and Ni on the carbonaceous catalyst of Rosenbaum.

Moreover, like Rossin, Rosenbaum does not teach or suggest the claimed alumina-nickel oxide catalyst or the surprising and unexpected results that are obtained with the claimed catalyst. Moreover, neither Rossin nor Rosenbaum teaches or suggests the claimed alumina-zinc oxide catalyst. Accordingly, withdrawal of the rejection of claims 44 and 50 is respectfully requested.

In view of the foregoing, the application is respectfully submitted to be in condition for allowance, and prompt favorable action thereon is earnestly solicited.

If there are any questions regarding this response or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response; please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #381AS/50311).

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Respectfully submitted,

A handwritten signature in dark ink, appearing to read "W. Jackson Matney, Jr.", is written over a horizontal line.

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MARKED-UP VERSION TO SHOW CHANGES

IN THE CLAIMS

44. (Amended twice) A process according to Claim 40, wherein the catalyst further comprises [15.1 to 40.6%] 7.2 to 61.3% by weight of zinc oxide.